

Name:

QUANTUM NUMBERS WORKSHEET

1. State the four quantum numbers, then explain the possible values they may have and what they actually represent.

2. State the number of possible electrons described by the following quantum numbers
 - a. $n = 3, l = 0$
 - b. $n = 3, l = 1$
 - c. $n = 3, l = 2, m_l = -1$
 - d. $n = 5, l = 0, m_l = -2, m_s = -1/2$

3. Give the n and l values for the following orbitals
 - a. 1s
 - b. 3s
 - c. 2p
 - d. 4d
 - e. 5f

4. What is the m_l values for the following types of orbitals?
 - a. s
 - b. p
 - c. d
 - d. f

5. How many possible orbitals are there for $n =$
 - a. 1
 - b. 4
 - c. 6

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6. Without referring to a text, periodic table or handout, deduce the maximum number of electrons that can occupy an:

a. s orbital _____ b. the subshell of p orbitals _____ c. the subshell of d orbitals _____

d. the subshell of f orbitals _____ e. the subshell of g orbitals ($l = 4$) _____

7. How many electrons can inhabit all of the $n=4$ orbitals?

8. Fill in the blanks with the correct response:

a. The number of orbitals with the quantum numbers $n = 3$, $l = 2$ and $m_l = 0$ is _____.

b. The subshell with the quantum numbers $n = 4$, $l = 2$ is _____.

c. The m_l values for a d orbital are _____.

d. The allowed values of l for the shell with $n=2$ are _____.

e. The allowed values of l for the shell with $n=4$ are _____.

f. The number of orbitals in a shell with $n = 3$ is _____.

g. The number of orbitals with $n = 3$ and $l = 1$ is _____.

h. The maximum number of electrons with quantum numbers with $n=3$ and $l=2$ is _____.

i. When $n=2$, l can be _____.

j. When $n=2$, the possible values for m_l are _____.

k. The number of electrons with $n=4$, $l=1$ is _____.

l. The subshell with $n=3$ and $l=1$ is designated as the _____ subshell.

m. The lowest value of n for which a d subshell can occur is $n=$ _____.

9. How many electrons can occupy any single orbital? _____

10. a. What is the value of l for a $4f$ electron?

b. What is the orbital designation for an electron in the 3rd shell and p sublevel?

c. What are the possible values of m_l for a $5d$ electron?

d. What is the maximum number of electrons in the 3rd energy level?

e. How many orbitals have the following quantum numbers: $n = 4$, $l = 2$, $m_l = -2$?

f. How many electrons have the following quantum numbers: $n = 4$, $l = 2$, $m_l = -2$?